

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
17 June 2004 (17.06.2004)

PCT

(10) International Publication Number  
WO 2004/049887 A1

(51) International Patent Classification<sup>7</sup>: A47L 9/00,  
5/36, 9/32

(21) International Application Number: PCT/GB2003/005189

(22) International Filing Date: 2 December 2003 (02.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0228153.3 3 December 2002 (03.12.2002) GB

(71) Applicant: TECHTRONIC INDUSTRIES COMPANY  
LIMITED (CN/CN); 24/F CDW Building, 388 Castle  
Peak Road, Tsuen Wan, N.T. (CN).

(72) Inventors; and

(75) Inventors/Applicants (for US only): ELSWORTHY,  
Christopher, Thomas [GB/GB]; 7 Magnolia Court,  
Fiddlers Green, Cheltenham GL51 0XB (GB). PROUD,  
Reuben [GB/GB]; 52 Gillam Street, Worcester WR3 8JT  
(GB). IVARSSON, Bengt, Ivar, Anders [SE/SB]; 27

(74) Agent: FORRESTER KETLEY & CO; Chamberlain  
House, Paradise Place, Birmingham B3 3HP (GB).

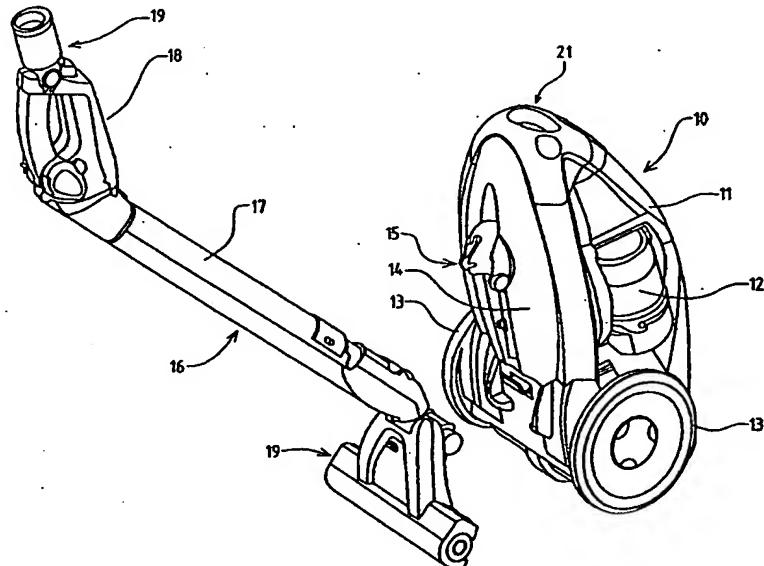
(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR,  
CU, CZ, DE, DK, DM, DZ, EC, EB, EG, ES, FI, GB, GD,  
GR, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,  
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,  
MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU,  
SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,  
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,  
SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,  
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:  
— with international search report

{Continued on next page}

(54) Title: SUCTION CLEANERS



WO 2004/049887 A1

(57) Abstract: A suction cleaner of the cylinder type comprising a main unit (10) including a source of suction and a dust separating/collecting means; a flexible hose; a wand (17); and a cleaning head (19); wherein the main unit (10) is able to be stood on its end and there is releasable catch means providing for the wand (17) with cleaning head (19) attached to be releasably connected to the main unit (10).

WO 2004/049887 A1



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

Title: Suction Cleaners

Description of Invention

5 This invention relates to suction cleaners ("vacuum cleaners") of the cylinder type (sometimes also referred to as the canister type since very few modern such cleaners are cylindrical).

10 A suction cleaner of the cylinder type comprises a main unit whose body contains a source of suction, i.e. a motor and an impeller for creating a suction airflow, together with a separator which separates entrained collected dust, dirt and other debris (all herein referred to as dust) from the airflow and retains it for subsequent disposal. The separator may include one or more cyclonic separators in which the dust is separated from the airflow by centrifugal force, and/or one or more filters. A flexible hose for the suction airflow is used to 15 connect the main unit to a cleaning head of whatever type is appropriate for the surface which is to be cleaned. A cleaner may be provided with a number of different cleaning heads/tools for different cleaning jobs. A floor cleaning head, e.g. a carpet or a hard floor cleaning head, characteristically is connected to the flexible hose with the intermediary of a rigid tubular wand (which may be 20 telescopically adjustable in respect of its length) which renders it easy for a user who is standing upright to work the cleaning head over a floor or other surface. Other tools for other cleaning purposes may be used with a wand.

25 It will be appreciated from the above that a cylinder type suction cleaner comprises several parts most notably the flexible hose, wand and one or more cleaning heads which can be relatively bulky and thus can present a storage problem when the cleaner is not in use. Often the main unit, if it is of a design which is intended to work primarily in a generally horizontal orientation, is able to be stood on one end so as to reduce its footprint, i.e. the area of floor space it

occupies, but storage space still has to be found for the hose, wand, and one or more cleaning heads.

It has been proposed, in EP 0887040 A and US 5836047 for example, that a suction cleaner may be usable in both upright and canister modes. A conventional upright cleaner comprises a first body part which is movable over a floor surface and constitutes or is provided with a cleaning head, and a second body part which is connected to the first and usually accommodates the motor and fan unit of the cleaner and the separator/dust collector. Usually the two body parts are pivotably connected together, so that the second body part may extend in a generally upright orientation or at an inclination to the floor surface which is to be cleaned. In the dual mode cleaners disclosed as aforesaid, the main unit of a cylinder cleaner is able to be used in an upright or inclined orientation with the wand fixed to it to form a handle, and the cleaning head separately connected to the main unit to be movable over a floor surface. When used in this mode, however, the footprint of the cleaner is still relatively large and hence the problem of compact storage is not solved.

Accordingly it is an object of the present invention to provide a suction cleaner of cylinder type wherein the problem of compact storage is addressed.

According to one aspect of the invention, we provide a suction cleaner of the cylinder type comprising a main unit including a source of suction and a dust separating/collecting means; a flexible hose; a wand, and a cleaning head; wherein the main unit is able to be stood on its end and there is releasable catch means providing for the wand with cleaning head attached to be releasably connected to the main unit.

Preferably the wand is, when connected to the main unit, usable as a handle for lifting and moving the main unit. To this end, the releasable catch means by which the wand is connectable to the main unit must have sufficient strength to support the main unit from the wand.

When connected to the main unit as aforesaid, part of the wand may lie within, or partially lie within, a recess provided in the main unit. Such recess may lie in the underside of the main unit, which faces the floor surface on which the main unit stands in normal use (although it is to be appreciated that 5 the main unit may also be usable when stood on its end, for example when cleaning stairs).

The catch means may comprise first inter-engaging catch formations provided respectively on the main unit of the cleaner and on the cleaning head (or a wand part in the vicinity of the cleaning head), and second catch 10 formations provided respectively on the main unit and on the wand spaced therealong from the cleaning head. A suitable spacing of such first and second catch formations enables the wand to be connected to the main unit sufficiently securely to use it as a handle as aforesaid.

The second catch formations may be engageable by an upward 15 movement of the wand relative to the main unit (having regard to the orientation of the latter when it is stood on its end). They may comprise a downwardly facing recess or recesses on the main unit of the cleaner and a complementary projection or projections on the wand, engageable in the recess or recesses. The first catch formation on the main unit of the cleaner may 20 comprise a catch member facing upwardly to engage a complementary member or formation on the wand or head, and spring biased to bias the wand upwardly and urge the second catch formations into firm engagement.

Such engagement of the first and second catch formations may entail placing the respective first catch formations in engagement with one another 25 and then pressing the wand downwardly to displace the catch member on the main body downwardly until the projection(s) constituting the second catch formation(s) on the wand are in a position to enter the recess(es) forming the second catch formation on the main body. The wand is then moved upwardly

by the spring biased catch member on the main body. Release of the wand from the main body is, of course, the reverse of this process.

The second catch formation(s) on the main body of the cleaner may be provided in association with a castor assembly beneath the main unit, the main unit being movable over a floor surface in normal use on such a castor assembly together with wheels provided at or adjacent the end of the main unit on which it is able to be stood.

These and other features of the invention will now be described by way of example with reference to the accompanying drawings, of which:-

10 Figure 1 is a diagrammatic perspective view illustrating a wand and cleaning head positioned in relation to a main unit of a cylinder type of suction cleaner, in accordance with the invention;

15 Figure 2 is an enlarged view similar to that of Figure 1, showing the respective catch formations on the wand/cleaning head and the main unit of the cleaner;

Figures 3a, b and c illustrate the engagement of the catch formations;

Figure 4 is a side elevation, showing the main unit of the cleaner with wand and cleaning head connected thereto.

Referring firstly to Figure 1 of the drawings, this shows a suction cleaner 20 of the cylinder type which comprises a main unit 10 with a body 11. The body 11 accommodates a source of suction, namely an electric motor and an impeller for creating a suction airflow, and a separator arrangement for separating from the suction airflow dust which has been collected and entrained in the airflow, and retaining it for subsequent disposal. The separator may include one or 25 more cyclonic separators in which the dust is separated from the airflow by centrifugal force, and/or one or more filters. Part of a cyclonic separating device is indicated at 12.

The body 11 is of somewhat elongated form, and is shown in the drawings standing in an upright attitude on its one end. At this end it is

provided with a pair of wheels 13 by which it is able to be moved over a floor or other surface in use, when it is intended to be in a generally horizontal orientation with an underside 14 of the body facing such surface. Towards the opposite end of the body from that at which the wheels 13 are provided, the 5 underside of the body is provided with a castor assembly indicated generally at 15 to facilitate its movement over the surface.

Also shown in Figure 1 is a wand assembly indicated generally at 16 comprising a rigid tubular wand 17 at one end of which a handle assembly 18 is connected and at the opposite end of which a cleaning head 19 is connected.

10 The wand may be telescopically extendible and able to be fixed at a required length to make it easy for a user holding the handle 18 to work the cleaning head over a floor surface. The handle 18 provides a pivotal connection at 19 for a flexible suction hose (not shown) extending to the main unit 10. The suction hose may connect to the main unit 10 at a detachable connection for 15 example at the front end of the body 11 as indicated at 21, or could be arranged to be deployed as required from, or retracted to, a hose storage reel incorporated in the body 11.

Referring now to Figure 2 of the drawings, this shows in greater detail a lower end part of the wand 17 and the cleaning head 19 fitted thereto. The 20 cleaning head has a connection part 24 which is fitted to the wand by a plug-in connection, and a part 25 which may incorporate a rotatable brush/beater bar drive driven by an electric motor or by a turbine device powered by the suction airflow through the cleaning head. In the case of an electrically driven brush/beater bar, the handle 18, wand 17 and connecting part 24 will be 25 required to provide for transmission of electrical power to the cleaning head. The part 25 is connected to the part 24 for pivotal movement about a transverse axis. More or less beneath the pivotal connection between the parts 24, 25 of the cleaning head when the wand is in use, there are wheels 26 on which the

cleaning head is movable over a surface being cleaned and, rearwardly of the wheels 26, there is a transverse bar 27 for the purpose described hereafter.

The castor assembly 15 comprises a body 29 carrying a pair of castor wheels 30 spaced transversely of one another, the body 29 being pivotable 5 relative to the body 11 of the cleaner about an upright axis when the cleaner is in its normal operative orientation supported on a floor or other surface by its wheels 13, 30. Between the wheels 30 the castor body 29 defines a valley 31 able to accommodate the wand 17, and on either side of the valley 31 there are catch formations in the form of downwardly-facing (when the castor body is in 10 the illustrated orientation) recesses 32.

Beneath the castor assembly 15 when the cleaner body 11 is stood on its end as illustrated, there is an upwardly facing somewhat hook-shaped catch member 34. This is spring biased upwardly, being displaceable downwardly in the direction of arrow 35 against suction spring biasing.

15 A part-cylindrical recess 39 is provided in the underside 14 of the body 11 of the cleaner main unit, extending from the catch member 34 to and slightly beyond the castor assembly 15. When the castor assembly is in the orientation illustrated, the recess 39 aligns with the valley 31 in the castor body 29. In the vicinity of the catch member 34, to opposite sides thereof and slightly 20 therebeneath when the body 11 of the cleaner is stood on end as illustrated, there are recesses 36 able to accommodate the wheels 26 of the cleaning head 19.

Spaced upwardly of it from its end connected to the cleaning head 19, 25 the wand has a member 37 provided with opposed transversely outwardly projecting catch formations in the form of pins, one of which is indicated at 38. The member 34 and transverse bar 27 constitute first cooperable catch formations, and the recesses 32 and pins 38 constitute second cooperable catch formations, together providing for the wand, with cleaning head attached, to be

connected to the body of the main unit. Such connection is illustrated in Figure 3.

The three views, Figures 3a, 3b and 3c, each show the hook-shaped member 34, pivotally mounted and spring biased upwardly by a biasing spring 34a. They also show the castor body 31 with its recesses 32. On the wand 17 they show the transversely outwardly extending pins 38, and on the cleaning head 19 the transverse bar 27. To connect the wand to the main unit, with the latter standing on its end, the cleaning head is presented to the unit such that its transverse bar 27 engages the catch member 34. Downward pressure on the wand displaces the catch member 34 downwardly against the force of its biasing spring until the pins 38 are able to enter and engage the recesses 32 in the castor body 31. When the downward pressure on the wand ceases, the spring 34a biases the member 34 upwardly so that the pins 38 fully enter the recesses 32 so as to be held captive therein. The wand is then securely fitted to the main unit of the cleaner, and can be used to lift the latter.

Figure 4 of the drawings shows the cleaner with the wand fitted to the main unit as aforesaid. The wand 17 lies partially in the recess 39, and valley 31 of the castor assembly. It will be noted that the part 25 of the cleaning head 19 lies closely adjacent the body 11 of the main unit, so that this configuration of the cleaner not only presents the advantage of being easily able to be moved using the wand as a handle, but also has a small footprint for storage purposes. The flexible suction hose which in use of the cleaner connects the wand to the main unit may be disconnected or left connected, as required. When the cleaner is to be used, removal of the wand from the main unit is the reverse of the above-described connection procedure.

In the present specification "comprises" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in

terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

## CLAIMS

1. A suction cleaner of the cylinder type comprising a main unit (10) including a source of suction and a dust separating/collecting means; a flexible hose; a wand (17); and a cleaning head (19); wherein the main unit (10) is able to be stood on its end and there is releasable catch means (32, 34) providing for the wand (17) with cleaning head attached to be releasably connected to the main unit (10), wherein, when connected to the main unit (10), part of the wand (17) lies at least partially within a recess provided in the main unit (10).
2. A cleaner according to Claim 1 wherein the wand (17), when connected to the main unit (10), is useable as a handle for lifting the main unit (10).
- 15 3. A cleaner according to Claim 1 or claim 2 wherein said recess (31) is in the underside of the main unit (10) when the main unit (10) is in its normal-use orientation.
- 20 4. A cleaner according to any one of the preceding claims wherein the catch means (32, 34) comprises first inter-engaging catch formations (34) provided respectively on the main unit (10) and on the cleaning head (19) or on a wand part in the vicinity thereof, and second inter-engaging catch formations (32) provided respectively on the main unit (10) and on the wand (17) spaced from the cleaning head (19).
- 25 5. A cleaner according to Claim 4 wherein the second catch formations (32) are engageable by an upward movement of the wand (17) relative to the main unit (10), having regard to the orientation of the latter when it is stood on its end.

6. A cleaner according to Claim 5 wherein the second catch formations (32) comprise a downwardly facing recess or recesses on the main unit of the cleaner and a complementary projection or projections (38) on the wand (17),  
5 engageable in the recess or recesses.

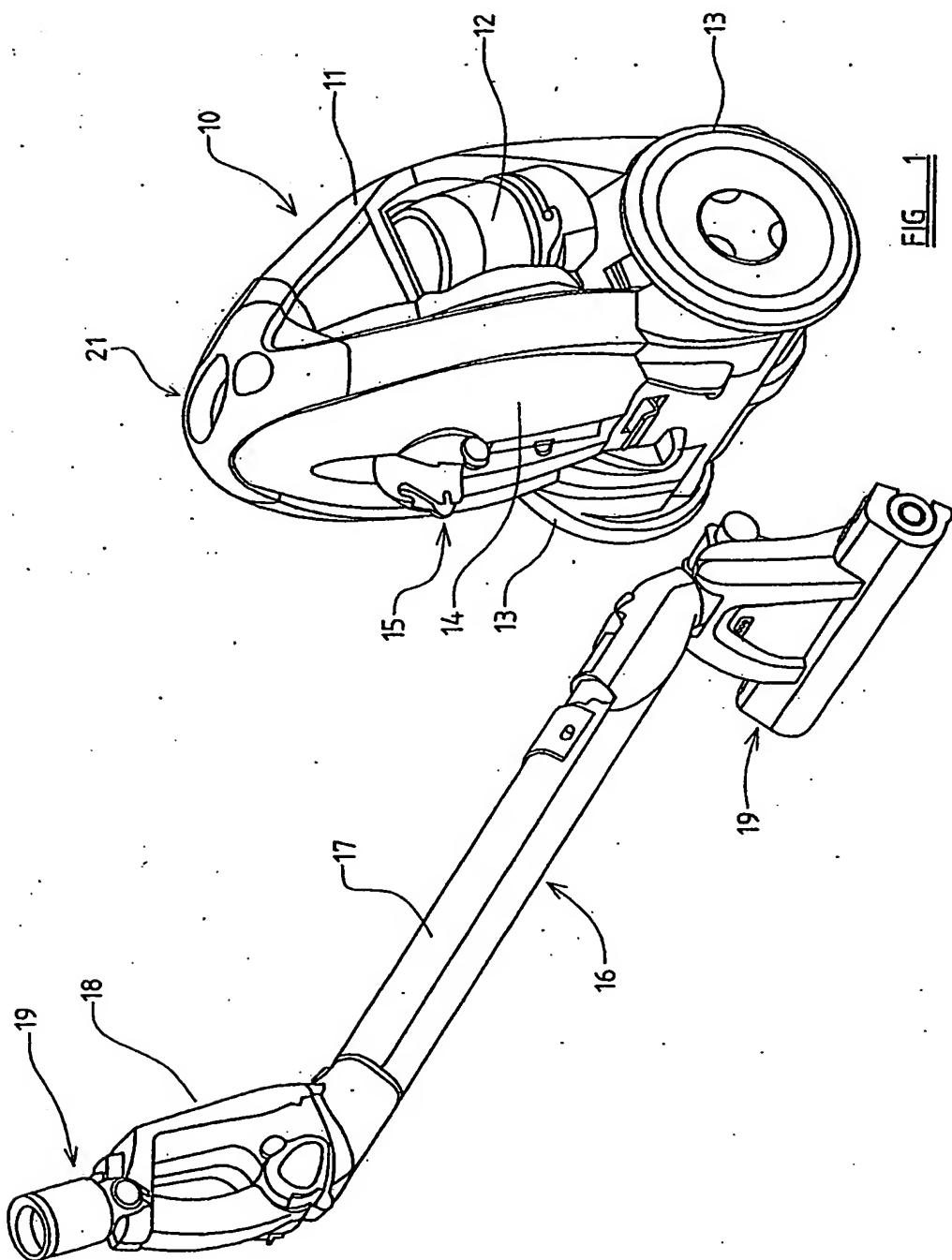
7. A cleaner according to Claim 5 or Claim 6 wherein the first catch formation (34) on the main unit (10) comprises a catch member facing upwardly to engage a complementary member or formation (27) on the wand  
10 (17) or head (19), and spring biased to bias the wand (17) so as to urge the second catch formations (32) into engagement.

8. A cleaner according to any one of Claims 4 to 7 wherein the second catch formations (32) on the main body (10) are provided in association with a  
15 castor assembly (15) on which the main unit (10) is movable over a floor surface.

9. A cleaner substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.

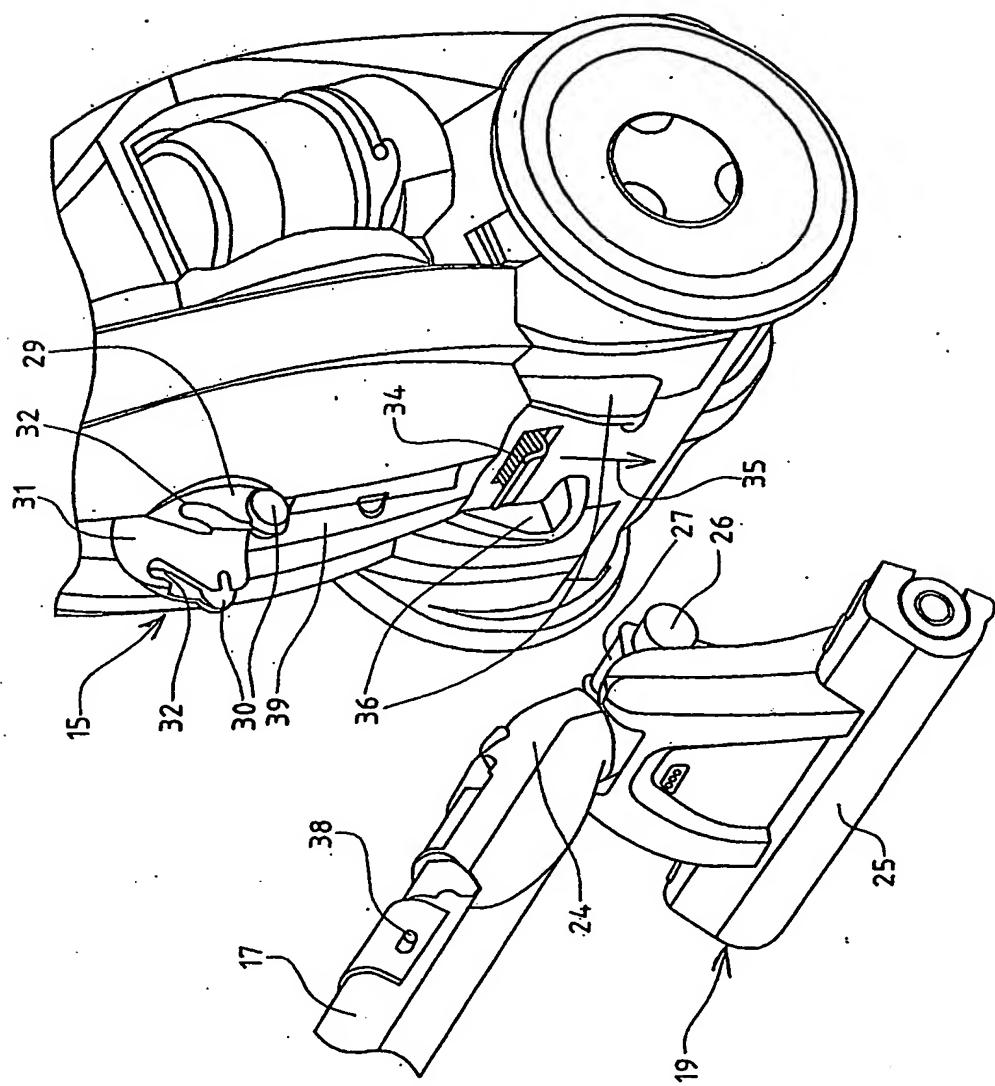
10. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.

1 / 4

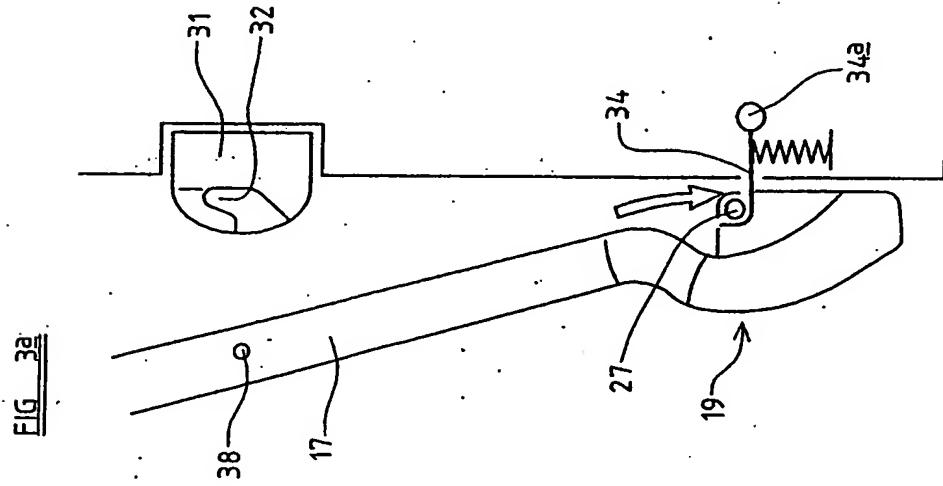
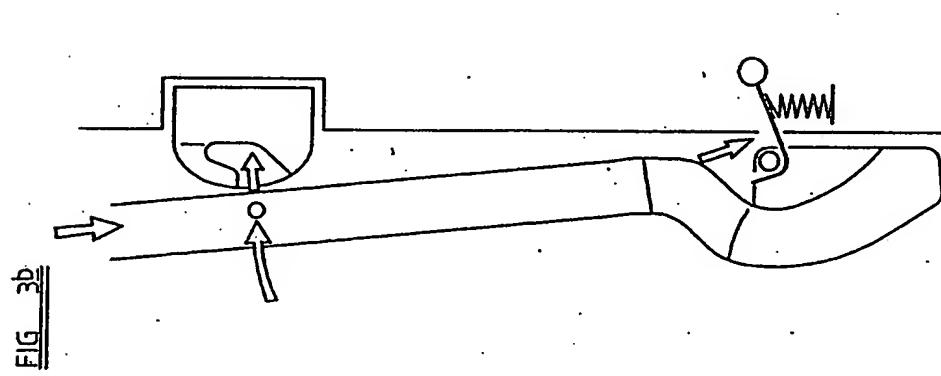
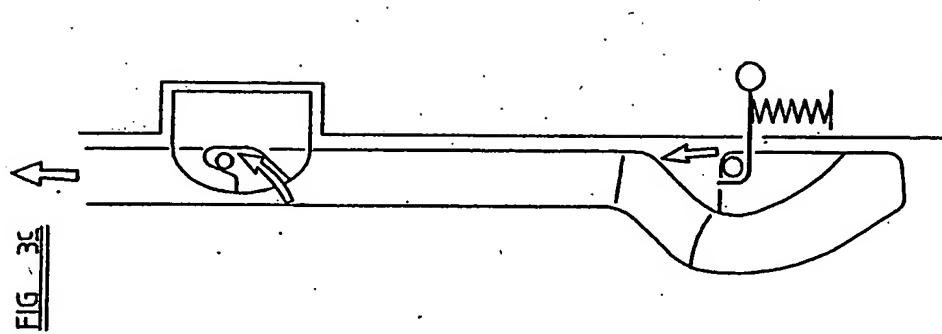


2 / 4

FIG. 2



3 / 4



4 / 4

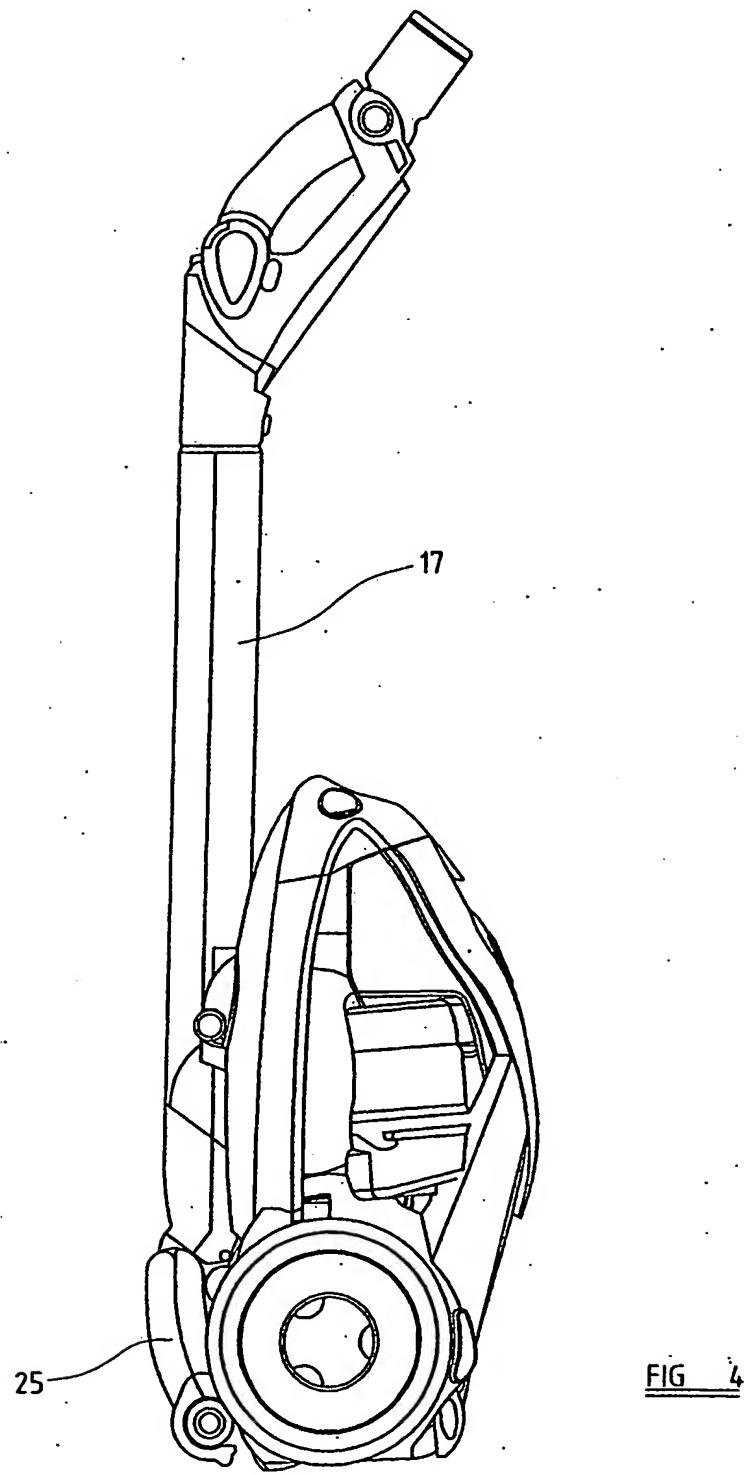


FIG 4

# INTERNATIONAL SEARCH REPORT

Int'l Application No  
PCT/GB 03/05189

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A47L9/00 A47L5/36 A47L9/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 38 34 686 C (ROWENTA-WERKE GMBH) 7 December 1989 (1989-12-07) the whole document	1-4
X	US 5 125 127 A (BACH OREST ET AL) 30 June 1992 (1992-06-30) the whole document	1-4
X	DE 94 20 797 U (STEUER HERBERT) 1 June 1995 (1995-06-01) figures 1-3	1
X	FR 2 425 227 A (SO VE MAR CO EUROP) 7 December 1979 (1979-12-07) page 3, line 1 -page 3, line 8	1
A	DE 299 00 460 U (WAP REINIGUNGSSYSTEME) 6 July 2000 (2000-07-06)	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the International filing date but later than the priority date claimed

- \*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- \*8\* document member of the same patent family

Date of the actual completion of the international search  18 March 2004	Date of mailing of the International search report  30/03/2004
--------------------------------------------------------------------------------	----------------------------------------------------------------------

Name and mailing address of the ISA  European Patent Office, P.B. 5818 Patentbaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx 31 651 epo nl Fax: (+31-70) 340-3016	Authorized officer  Martin Gonzalez, G
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------

# INTERNATIONAL SEARCH REPORT

Int'l Application No  
PCT/GB 03/05189

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A47L9/00 A47L5/36 A47L9/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 38 34 686 C (ROWENTA-WERKE GMBH) 7 December 1989 (1989-12-07) the whole document	1-4
X	US 5 125 127 A (BACH OREST ET AL) 30 June 1992 (1992-06-30) the whole document	1-4
X	DE 94 20 797 U (STEUER HERBERT) 1 June 1995 (1995-06-01) figures 1-3	1
X	FR 2 425 227 A (SO VE MAR CO EUROP) 7 December 1979 (1979-12-07) page 3, line 1 -page 3, line 8	1
A	DE 299 00 460 U (WAP REINIGUNGSSYSTEME) 6 July 2000 (2000-07-06)	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&\* document member of the same patent family

Date of the actual completion of the international search

18 March 2004

Date of mailing of the international search report

30/03/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Martin Gonzalez, G

**INTERNATIONAL SEARCH REPORT**

Int'l Application No

PCT/GB 03/05189

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
DE 3834686	C	07-12-1989	DE	3834686 C1	07-12-1989
US 5125127	A	30-06-1992	DE	8913502 U1	18-01-1990
			DE	4036314 A1	16-05-1991
			DE	9015516 U1	31-01-1991
			ES	1015349 U1	01-07-1991
			FR	2654326 A3	17-05-1991
			GB	2237982 A ,B	22-05-1991
			IE	904106 A1	22-05-1991
			IT	220416 Z2	21-09-1993
			JP	3072854 U	23-07-1991
			LT	401 A ,B	25-10-1994
			LV	10376 A ,B	20-02-1995
			NL	9001891 A ,B,	03-06-1991
			PT	8209 U	05-07-1991
			SE	466985 B	11-05-1992
			SE	9002933 A	16-05-1991
			SU	1805907 A3	30-03-1993
DE 9420797	U	01-06-1995	DE	9420797 U1	01-06-1995
FR 2425227	A	07-12-1979	FR	2425227 A1	07-12-1979
DE 29900460	U	06-07-2000	DE	29900460 U1	06-07-2000